SUPPLEMENT.

The Mining Journal,

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FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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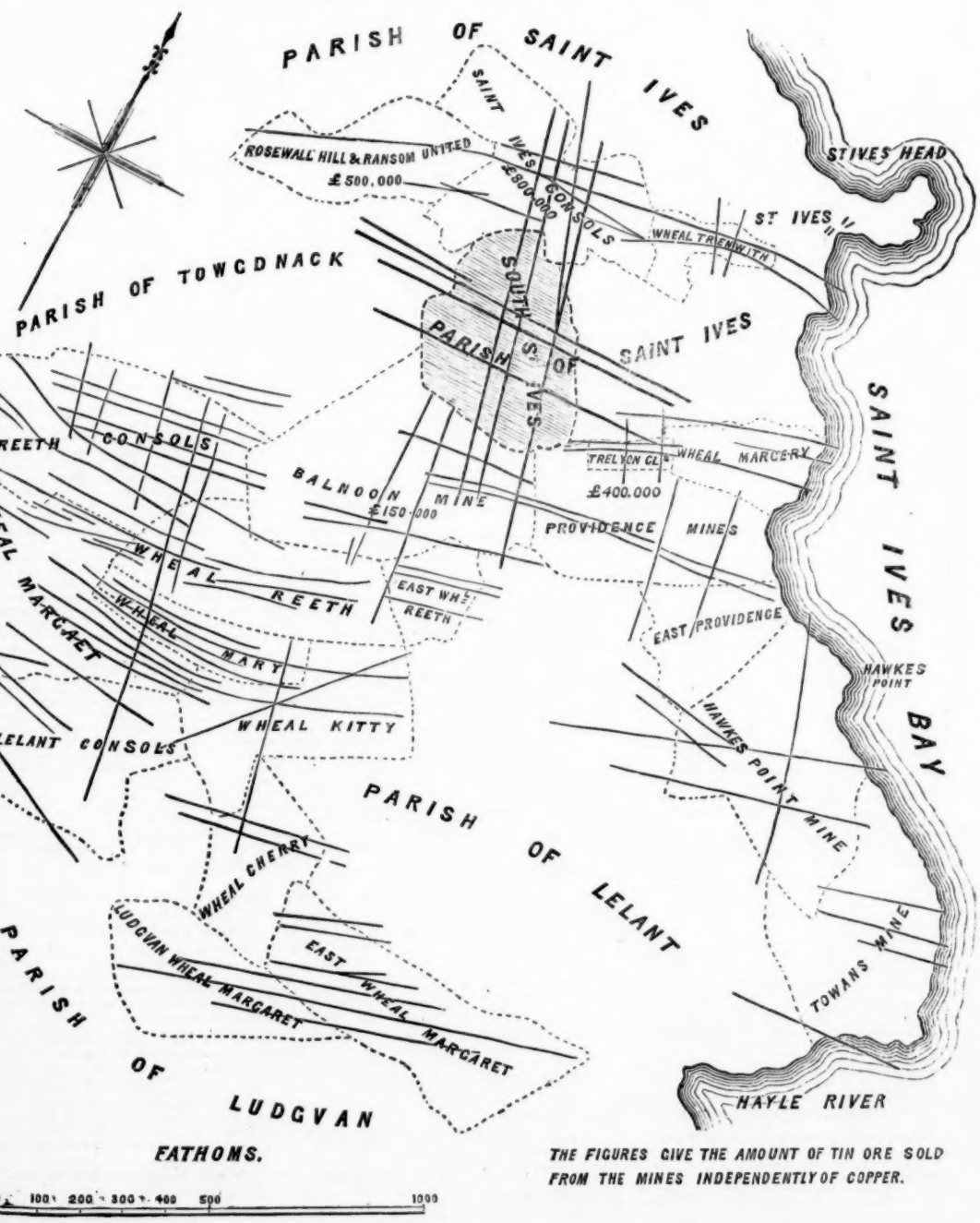
MAP OF THE SOUTH ST. IVES, AND THE ST. IVES CONSOLS MINING DISTRICT, CORNWALL.



THE FIGURES GIVE THE AMOUNT OF TIN ORE SOLD FROM THE MINES INDEPENDENTLY OF COPPER.

Nothing could well be more attractive in its appearance and promises as a productive and profitable undertaking, than the South St. Ives Sett, delineated in the above plan. The district in which it is situated has a celebrity which has been purchased by the wealth it has yielded, and now that, after some considerable effort directed to the acquisition, a grant of this fine portion of it has been obtained, that celebrity, there is good reason to believe, will be considerably augmented. The St. Ives Consols is known to have been a mine of wealth to its holders, having already yielded nearly a million sterling, a single deposit producing more than a hundred tons of tin a quarter, and the mine being at present nearly as rich as ever. The Providence, Trelyon, Rosewall Hill, Balnoon, and Trenwith have all yielded large returns; and this sett of the South St. Ives stands, as will be seen, in the very midst of them, possessing the same geological features, a granite stratum, not far from its junction with the green stone, than which a more favourable feature could not be wished for. Captain John Nancarrow, who may be accepted as an authority, in this district especially, unhesitatingly gives it as his opinion, that, in addition to the three east and west lodes that have been already seen, others must come through the sett, intersected by the St. Ives Consols cross-lodes and cross-courses, the two principal cross-courses being probably together, and the two cross-lodes near each other; so that the same good fortune which gave the St. Ives Consols those large deposits in which it rejoices, may fairly be anticipated to have in its hands some equally valuable deposits in the South St. Ives. This is, in fact, the concurring conviction of all who have examined the sett; and the grounds upon which that conviction rests, as set forth in their respective reports, published in the prospectus, can scarcely fail to command the assent of all who have paid attention to mining matters, especially in this, one of the most favoured districts of Cornwall.

ON THE MECHANICAL DRESSING OF ORES.

[Notes from a Lecture by Prof. W. W. Smyth, Royal School of Mines, London.]

Having already considered some of the forms of machine for comminuting ores, we have still another class of machine for the same purpose, the object of which is to comminute the ore to a state of fine division without pulverising it to a powder. The machines to which we refer are called stamps, and have been employed by miners for years, and even centuries, and have been universally found satisfactory, for two reasons—firstly, because they get through a greater amount of work in proportion to the power employed than an any other machines; and, secondly, because they comminute the ore without reducing it too fine. In considering these machines from a general point of view, we may say the stamps are made of a heavy mass of cast-iron, placed at the base of a lifter of wood or wrought-iron; and three or four of these being placed together in one case form a battery or set; and, when few in number, may be worked by water-power, and when multiplied are usually worked by powerful engines. In olden times stamping machines were made very coarsely, and there were usually three heads in one box; but the heads were irregular in form, and consequently the stuff was most unevenly broken up. In treating of stamping machines we will consider them under the following divisions:—

1. The form of the stamp-head.—2. The lifter.—3. The means for raising the lifter.—4. Kofer.—5. The frame in which the stamps are fixed.—6. The mode of outlet for the stamped material.—7. The barrel by which the stamp-heads are raised.

First, then, of the stamp-head. These should generally weigh from 1 to 1½ ton for ordinary stuff, although where the rock is very hard the weight must be increased to 5 and even 6 cwts. In most cases the stamp-heads are of cast-iron, and 18 to 20 in. in length. The heads, as commonly made in the foundry of the present day, are cast with a shank, by which the lifter may be very readily attracted to the head.

Secondly, of the lifter, which was made invariably in olden times of wood, deal, pinewood, or ash being generally preferred. This sort of lifter is, however, now-a-days invariably made of iron. The weight of the lifter is a matter for consideration; an extra weight in the lifter certainly tends to give a more uniform blow, and for this reason iron lifters would seem to be preferable. We must, however, allow that iron lifters are liable to get thrown out of shape after some use. Wooden lifters are generally considered preferable to iron ones, since they work more evenly and produce less friction. Some excellent examples of wooden lifters may be seen at the Charleston United Mines.

Thirdly, as to raising the lifter, we find the head most effectually performs its functions when raised from 10 to 12 in. The lifting is effected by means of what is called a tongue, of which the best are made of iron. One end of the tongue passes through a slot in the side of the lifter, and is there fixed with wooden wedges, and the whole kept tight by a wedge, binding the end of the tongue which has passed through the lifter. The lifter must be retained in its position on either side by braces. Now, on raising the lifter a rotatory motion is necessarily given to it, which causes a great amount of friction, and to avoid this numberless devices have been proposed; one was to make a hole in the lifter into which the cam raising it should fit; such an idea, however, cannot be entertained, as the arrangement must so materially weaken the lifter. Another proposal has been to raise the lifter by a double cam, one arm passing on each side of the lifter. We cannot see, however, that such a devise can at all diminish the friction. The question then arises, what are the best means of avoiding friction? We think, by adopting the following simple means, common on the Continent, and sometimes seen in England, a great deal may be prevented. The plan is to place between the bearing parts of the frame and the lifter long thin slips of wood, which, if kept well greased, will act as slides. In the tin districts it is more usual to supply a guide made of a triangular piece of iron fixed by screw bolts into the pieces at the back of the brace up which the lifter slides. An Australian form of stamps has lately been brought out as a great improvement. Its peculiarities are, that both the lifter and head are of circular iron, and its so-called advantages that a rotatory motion is given to the head as the cam lifts it. For many reasons, and some of which we have enumerated above, this motion is peculiarly objectionable, and we may consign this machine without hesitation to the limbo of obscurity.

We now come to the kofer and frame, which we may truly say constitute the most important parts of the stamps. The whole frame is universally based on some good concrete, and is divided into partitions by uprights. The kofer may be looked on as a box of wood of any convenient form, the most important part of which is the arrangement for allowing the escape of the ore directly it is reduced to the proper state of fineness, since, if kept in the kofer beyond that time, there must of necessity be a loss in the finer particles of the ore. Now, the escape of the ore is usually effected through a grating, of which there is one in front of the kofer, and one at each end. As the stamp-head, after being lifted, descends, a wave will be produced in the contents of the kofer, which, in its passage, will carry through the grating the comminuted particles. There are other forms of kofer, where the ore escapes over the top of the box, but this form is used only when it is required to stamp very fine. Sometimes the ore escapes through a slit in the upper part of the kofer, which is termed "stamping in the flash." In Hungary they have a very nice way of regulating these flash stamps, by placing a little slip door between the slit and the stamp-head. There is no part, be it remembered, of the stamping process which requires such great care on the part of the agent, than the size of grating through which he shall pass the stamped stuff. A great deal depends on it, and experiments should be continually made to arrive at the proper degree of fineness to which it is desirable to reduce any particular kind of ore.

We must now say a few words on the last division of our subject, "The Barrel." It consists of a barrel of cast-iron, with holes in it for the cams, and is cast with proper bearings to fit on plumber blocks. It may be worked by water-power or steam. A stamps, to be working at the greatest speed for perfect efficiency, should lift each head to make from 50 to 60 blows per minute. The quantity of stuff stamped must depend on its hardness, as also on the proportion of water admitted. The number of labourers required to keep stamps in work should be four men to every 32 heads. In some Cornish mines there are from 30,000 to 36,000 tons of tinstuff stamped per 12 months.

BLAST-FURNACE GASES FOR RAISING STEAM.

A blast-furnace in full work will consume 200 or 220 tons of fuel per week with ease; or, in other words, coal and coke sufficient to produce in round numbers 600-horse power for twelve hours each day of the week, allowing a little over 4 lbs. of coal to produce an indicated horse power. This is by no means an extravagant estimate, and an engine of the size commonly employed for blowing iron furnaces which requires more reflects no credit on its maker.

In the mining districts coals are very cheap, and therefore economy in their use—unless that use is very extended—is not regarded from the proper point of view; but in some cases the pecuniary worth of an article is no measure whatever of its value, and, therefore, although fuel is cheap, yet that in no way affects the difficulties or annoyances met with in getting it exactly at the right time to the right place; in other words, haulage from the pit's mouth to the furnace, often over a considerable distance, is for the most part a sufficiently troublesome operation to make furnace managers and proprietors wish that some scheme could be devised to make a minimum of coal do a maximum amount of work. Prophets arise day by day in our land, who are always more ready to foretel a vast saving, than to show how that saving is to be effected. In the production of power there is certainly room for great improvement, but the manufacture of iron is a very distinct affair from the raising and using of steam. The one depends for its successful working on chemical laws pretty well understood and fairly regarded; and, therefore, unless the nature of ores can be changed, it is very unlikely that the quantity of fuel necessary for the production of a ton of iron will ever admit of any considerable reduction. The other, however, depends more on matters of mechanical detail than on almost anything else, and until these have reached the acme of perfection, no man can say that a further diminution in the expenditure of coal per horse power per hour is hopeless.

Fuel is required for other purposes than the reduction of ores at an ironwork. Without the aid of the steam-engine, a blast-furnace would possess no more valve than a pile of old bricks. It was discovered long ago that, although economy was not to be looked for within the walls of a furnace which would bear no tampering with its operations, yet that without these walls other fires existed in close proximity, which ran away with a great deal of fuel that might possibly be applied to a better purpose. Not only was there a vast deal of heat wasted at the mouth of the blast-furnace, but it was known that thousands of cubic feet of gas, the best of all fuels, were wasted as well, and so men began to cast about for the means of converting this waste heat and wasted fuel to the purpose of raising steam; and thus the utilisation of the gases from iron furnaces has gradually grown into a very important subject; and hundreds and thousands of pounds sterling, and we are afraid to say how much trouble and horse labour, are now saved and spared, instead of being wasted and expended on a purpose which is far better effected, even in the mechanical sense, by comparatively novel arrangements.

In the first instance, the great body of flame seen to ascend from the mouth of a blast-furnace was too tempting a source of heat to be overlooked in favour of the more refined idea of leading away the yet unconsumed gas, and producing the flame elsewhere. We find, therefore, that the first attempts at raising steam by the aid of the fuel undergoing combustion were intended to utilise the waste heat, not the gas. Accordingly, boilers were placed on the top of the furnace, and steam-pipes led down from them to the engines. This plan, however, proved totally inefficacious. The presence of the boiler prevented the access of air; the gases did not burn as before; the water could hardly be induced to boil sluggishly, and grievous inconvenience was encountered in charging the furnace. The boilers were quickly removed; they served no good purpose "perched up aloft," and, so far, the scheme was a failure. But, even before any decided attempt had been made at getting steam in this way, French chemists had availed themselves of the gases for other purposes.

M. Aubertot, a French ironmaster, obtained a patent in France as early as the year 1811, for the application of the waste gases to the cementation of iron in suitable furnaces, and the burning of bricks. The brick-kiln, or the steel-furnace, as the case might be, was constructed on the top of the blast-furnace, a little to one side; a short stack sufficed to draw in the escaping gases through a hole about 18 in. square, provided with a sliding door to exclude them at pleasure; a little fire was lit within the kiln, and was kept up for twenty-four hours, after which time the cast-iron door was raised, and the blast-furnace gas suffered to enter, which it did freely, under the influence of the draught caused by the kiln-stack. Two sides of the furnace mouth were guarded by walls to keep off the wind; one of the others was occupied by the kiln, while the fourth was left clear for charging. The heat produced was very intense, a result to be expected from the combination of the carbonic oxide and hydrogen gas, with enough atmospheric air to effect a vivid combustion. Berthier published an excellent paper on the Aubertot process, in 1814. We thus find that the idea was successfully worked out more than half a century ago on the Continent, while our ironmasters scarcely stirred in the matter until within the last twenty-five years. The reason of this is obvious. Coal is cheap in England, dear in France; and, therefore, in one country a moderate saving is regarded as of little moment; whereas, in the other it is looked on as of great importance.

Those who are not conversant with the details of the iron manufacture very naturally fall into the error that it is the waste *heat* from the blast-furnace which is used for getting up steam. We often hear, unhappily, of fearful explosions resulting from the failure of boilers in the iron districts worked by waste heat. Such boilers, however, have nothing to say to smelting-furnaces; they are invariably heated by the flame escaping from *puddling* furnaces, and are, for the most part, extremely efficient. The heat absorbed in reducing the molten iron is moderate in quantity, and a vast body of flame from the hearth can easily be passed through the flues of a vertical central boiler, round which the furnaces are grouped. In the case of the blast-furnace, we have seen that every attempt at using waste flame has been a failure; the temperature at the mouth of such furnaces is always very moderate, and the presence of the boiler is sufficient to chill the gases and extinguish the flame. About 34 per cent. of these gases, however, consist of hydrogen and carbonic oxide, and under the most successful arrangements a large proportion of the entire body of gas is conveyed through large mains, from the upper part of the furnace to some locality beneath or within the boiler, where it is re-ignited and supplied with atmospheric air to complete its combustion.

The means adopted for the withdrawal of the gas, or rather for fitting the pipes in the tunnel head, are very various, and exercise an influence, the importance of which cannot be over-estimated, on both the quality of iron produced and the yield of the furnace. Truran, Percy, and others of less note, have treated on this subject at length, and to their writings we must refer our readers for further information on this branch of the subject, as we are now speaking more of the use than of the obtention of the gases. The general principle involved is the fitting of a tube within the tunnel-head, within which tube a partial vacuum is maintained by the aid of a tall stack in connection with the boilers. Owing to the influence of the blast, a pressure exists within the furnace slightly in excess of the atmosphere. The fresh charges exclude the atmosphere to a great degree from the mouth of the taking-off pipe, the upward rush of a portion of the gases, which is wasted through the broken limestone, coke, and ore, being sufficient to prevent its entrance, while the partial vacuum is sufficient to determine the entrance of the remaining products of combustion into the gas main, through which they are conducted to the boilers.

Mr. Taylor, in a communication to Dr. Percy, so well describes the whole *rationale* of the system, as successfully carried out by him at Rustrel, in Vaucluse, that we cannot do better than quote his words. After some preliminary remarks, he says:—"The plan which I adopted was to close the top of the furnace, and thus prevent the ignition of the gas, which made its escape through a large cast-iron pipe, which passed from the upper part of the furnace to the boilers, which were placed at some distance from the base of the furnace. A mode of charging had to be contrived without opening the furnace top, and this was accomplished. My opinion was that this scheme could only succeed by ensuring a due admixture of atmospheric air with the gas, so that complete combustion might be produced. To effect this admixture, the gas from the main pipe was made to pass under the front end of the boiler through a number of narrow passages or slits, and the atmospheric air was admitted by other similar passages intervening with the gas passages. To admit more or less air, a valve was placed on the main air passage. The entire success of this project was soon found to depend on the use of this valve, for, if too much air entered, enough steam was not generated to work the engine, and if too little, the same result followed. But when we hit the right proportion, steam blew off at the safety-valve most abundantly. Care must be taken with a boiler heated with gas as above described, as in case the furnace ceases to have the blast on, an explosion would be likely to take place, if, on putting on the blast, the gas and air are admitted to the boiler without some fire is placed under the boiler to ignite it on its arrival."

The whole secret, it is evident, lies in admitting the proper quantity of air, and, however various the mechanical details may be, they must invariably minister to this end, or success is hopeless. The entire system of the utilisation of the waste gases from blast-furnaces has afforded food for more discussion and animadversion than almost anything else connected with the iron manufacture. We find Truran opposing it in vigorous terms; we find it neglected here for the fourth part of a century after it had been tried, and found good, in France; simply, we believe, because little or no attention was paid to the best means of consuming the gases once obtained. That these cannot be obtained without trouble and expense in the first instance is indisputable, but apparently this section of the problem is now solved, and solved successfully. In Staffordshire, Wales, and France the gases are taken off the tunnel-head under the best arrangements, without in any way affecting the quality or the yield of the iron, or economy of the furnace; in other words, all that can be got from the combustion of the gases is clear gain. To the construction of the boilers and the fire-places within which the gases are to be burned, ironmasters and engineers should now devote their attention. All existing arrangements are open to improvement, and that this improvement can be effected at a cost nominal as compared with the sums already expended in the experiments on the method of taking off the gases, there can be no doubt.—*Mechanics' Magazine.*

GOLD MINING IN VICTORIA—No. III.—QUARTZ MINING.

BY PHILIP A. EAGLE.

NUMBER OF REEFS DISCOVERED—AREA OF DISTRIBUTION—IMPROVEMENTS IN CRUSHING—GEOLOGY OF GOLD-BEARING ROCKS—PRACTICAL REMARKS ON QUARTZ VEINS AND DEPTH OF LODES—STATISTICS.

Great as have been the profits realised from alluvial mining, these have been surpassed by the working of the quartz veins of the colony. The importance of this latter branch of industry it is difficult to overrate, whether regarded as giving a permanent character to gold-mining enterprise, making it a staple pursuit, or as the source whence the chief supply of the precious metal must ultimately be derived. In traversing the up-country districts one cannot avoid being struck with the attention and labour now systematically bestowed on quartz mining by both large and small companies. It appears that there are upwards of 1800 distinct veins of quartz laid down on the mining maps; and, simultaneously with the progress of the "prospector," improvements in the mode of extracting the precious metal have taken place. The lowest charge for crushing is about 10s. per ton, but quartz containing 8s. worth of gold per ton is made to yield 24 per cent. upon a considerable capital, by the reduction of a large quantity of stone per week. At Ballarat, with improved machinery and plenty of water, this is a profitable investment, and the poorer quartz is now being generally experimented upon, while five or six years back quartz could not be reduced at a profit if it contained less than 1 or 2 ozs. of gold per ton.

The immense importance of the recent improvements in quartz-crushing will be understood, when it is stated that while reefs yielding from 2 ozs. and upwards to the ton are not uncommon, those averaging from a quarter to one ounce per ton are found to intersect three-fourths of the total mining area. A reference to the map of the colony will furnish the best illustration. By drawing a line from Anderson's Creek (the first gold field opened) to the mountainous ranges of Gipps Land; thence in a northerly direction as far as the Beechworth (Ovens) division, which also includes Chiltern, the Buckland, and Wahgunyah; then taking a westerly course, traversing the Waranga, MacIvor, Bendigo, Inglewood, and Tarnagulla fields, penetrating the Upper Pyrenees and Wimmera district, as far as the slopes of Mount William, and returning along the south-western fields of Ararat, Ballarat, and Steiglitz to within a few miles of Geelong, the reader will perceive the extent of country over which quartz veins are proved to exist.

The science of geology divides the vast length of time from "the beginning" into three periods—the primary, secondary, and tertiary. During the first of these we have the volcanic rocks, the slates, sandstone, coal and limestone formations, over which, during the latter period, the clay marl and sand have been deposited,

It is in the primary or lower palæozoic rocks* that the quartz veins occur. These rocks (slate and sandstone) have been formed by the action of water, and when in their original position were from 3000 to 6000 ft. in thickness, but by the upheaval of the granitic rocks, they have been thrown upon edge, the disturbance causing numerous fissures in them, which have since been filled with silica; how has not yet been satisfactorily determined. To form any adequate idea of these operations, the mind must discard all notions of time; ages must be regarded as minutes, and cycles as years. Frequently whole rivers have been covered in, and form what are known in alluvial mining as wet leads. The quartz veins invariably assume a true meridional direction,† and are inclined either east or west, varying in their dip from horizontal to nearly vertical. Unlike the well-established characteristics of inferior metals (from a knowledge of the elimination of which much of the present theory and practice of working quartz veins doubtless have been derived), the elements which should enter into some preliminary calculation in these ventures are often difficult of investigation, through when once fairly determined, there are perhaps few undertakings which are more remenerative in character than a well-won quartz lode.

The indications of auriferous stone in the Victorian mines, in some cases resemble those which are found to exist in the copper mines of England. Masses of quartz, having frequently a burnt appearance, with iron oxide, lie along the line of reef, forming beneath the surface what is called a "flookan" or lava streak. Thus, "cropping out" on the surface, gold-bearing stone is sometimes directly traceable, but more commonly the lode is connected, at a greater or lesser depth, by a spur or "leader." Sometimes a vein of auriferous quartz, when followed down from the surface, in seeking for a reef, will for a considerable distance lose all trace of golden stone, until (as in the case of the Maryborough "Mariners") the main reef is reached, perhaps at a depth of 300 or 400 ft.; and it is in such cases that the confidence and pluck of the miner are most severely challenged. At other times a succession of leaders will be found, each containing gold, and carrying to the reef. Occasionally surface seams are disclosed which contain the richest stone, thus compensating for their deficiency of width, but generally they lose all value after being tried to some depth, when unconnected with a proper lode. Many of the reefs have been discovered in alluvial workings, both in sinking and tunnelling, not unfrequently forming the bed-rock of a shaft; but it is invariably found that those which are opened and followed down from the surface yield the most satisfactory results.

A number of the principal reefs consist of a succession of blocks of quartz, separated by masses of sandstone and slate. These blocks, or "makings" as they are termed, are found of various thicknesses, and extend to an unascertained depth. Other reefs, again are formed of an unbroken body of quartz, workable throughout. The width of the reef will vary considerably, a paying lode sometimes reaching to 30, and even 50 ft., at other times narrowing to a mere thread; while it will also occasionally happen that after considerable working the lode will be lost for several feet, or it may split up into leaders and be again recovered.

A number of the reefs now working were first "laid open" in the early days of alluvial mining, where rich surface ground led to a few feet of rubble and "casing" being broken up, when in default of the presence of payable gold, added to the digger's ignorance of the theory of gold deposits, these claims were abandoned, to be afterwards developed into mines of almost inexhaustible wealth. It not unfrequently happens that when the upper portions or "cap" of the reef, which is often very rich, is worked out, the claim is deserted, either from its supposed exhaustion, or from an uncertainty of the lode. The difficulty of properly tracing out a lost lode has often led to the surrender of valuable ground, and this, perhaps, has been experienced more especially in leaders which, after being carried down successfully to various depths, have failed, and were supposed to have run out; whereas, with a better knowledge of working quartz veins, in all likelihood a recovery of stone at a greater or lesser depth would in such cases be made, perhaps equally as valuable as at the upper part or cap.

With regard to the permanent productiveness of gold-bearing lodes, it may be stated that at the Maryborough, Sandy Creek, and Inglewood mines (the two latter large and important reefing districts) it is found that after the "upper lode" has been penetrated, and a permanent vein carried down, the stone continues to improve in quality as the reef is developed; and where this increase fails, it still generally sustains the average of previous yields. And although this experience is not likely to prove the rule throughout the colony, it has sufficiently established its importance to override the usually admitted theory of gold-bearing rocks, and is equally opposed to the dicta of our most eminent geologists, who have prophesied the exhaustion "of gold deposits" and "auriferous veins" at great depths. It may be that a majority of the Victorian reefs will betray signs of exhaustion at increasing depths, but certainly all previous experience goes far to negative this supposition, and, looking at the very favourable results which have been won at 500 ft., there is no substantial reason why the veins should not prove equally productive at 5000 ft., or at even a greater depth. When, a few years back, little or no knowledge had been obtained in connection with reefing, and operations were greatly impeded by the absence of suitable machinery, the properties of quartz veins were comparatively a *terra incognita* to the gold miner, the theory of exhaustion below a certain depth‡ being then generally entertained; in fact, there are numerous instances on record, to go no further back than 1857, where rich and palpably gold-bearing lodes were thrown up as being "worked out." But the labours of the present day strongly refute the doctrine of the poverty of the lower strata, and it must be admitted that to those interested in the solution of the question recent disclosures offer every encouragement to deep mining.

It may be mentioned that 100 tons of stone, taken at a depth of 550 ft. from one of the earliest wrought shafts in the colony, lately produced 543 ozs. of gold, or at the rate of 5½ ozs. to the ton. At Tarnagulla, at a depth of 450 ft. the main reef is yielding 5 ozs. to the ton; at Bendigo, at 500 ft., is yielding 4 ozs. to the ton; and at 400 ft. auriferous stone has been obtained from Poverty Reef which produced as much as 40 ozs. to the ton. At the Albion Company's ground at Steigiltz the yield has steadily increased from 4 ozs. to a ton at 200 ft. to 7 ozs. to the ton at 400 ft., the stone in the bottom of the level now being worked appearing richer than any hitherto crushed. This testimony could be supplemented by statistics from other districts, including the working company at the Clunes, at Adelong, Inglewood, and the St John del Rey Company, Brazil, all contributing to show that the exhaustion of our gold mines is a contingency too remote for present speculation.

QUARTZ MINING ADVENTURES—POVERTY REEF, TARNAGULLA—PRINCE OF WALES' CLAIM—MR. THOMAS KING'S CLAIM—COLUMBIAN REEF, INGLEWOOD—ACADIAN, INKERMAN—QUOTATIONS OF YIELDS.

The amount of capital at present involved in quartz mining enterprise in Victoria has been estimated at a million and a half, and the value of the machinery in operation being placed in round numbers at one million sterling. A considerable amount of both labour and capital have necessarily been expended on properties which have not yielded any remunerative results. During the joint-stock mania, a few years back, when some remarkable successes gave a strong impetus to mining speculation, a large number of reefing ventures were attractively put forward, of the individual merits of which it is, perhaps, not too much to say that the projectors at the time were but little better informed than the public. Mismanagement and administrative expenses soon wrought a considerable change in the prospects of the shareholders, and, after a totally inadequate trial of the mines, a large proportion of the schemes collapsed, and the ground was thrown open, to be, in many instances, afterwards taken up by private enterprise and made productive.

There are in all 35 public companies connected with quartz mining, of which 23 are dividend and 12 progressive mines. Of the former, the Clunes Quartz Company ranks the highest, the shares of which (15*l.* paid up) are worth 500*l.* to 600*l.* Some of the reefs have proved singularly prolific, and, with one or two exceptions, the best results of quartz mining enterprise in Victoria have been obtained by private individuals.

When we read of 4000*l.* having rewarded a fortnight's labour in one claim, of a "pocket of quartz" yielding 10,000*l.* in another, and of 4 tons of gold, or something less than half a million sterling, having been taken from a third, within eight years, we are reminded of Dr. Johnson's remark on Thurle's Brewery—that it suggests "the potentiality of growing rich beyond the dreams of avarice." When, in a drama, we witness the unexpected return of a rich uncle from the Indies, with a diseased liver, a yellow face, and "cores" of rupees, who raises the poor struggling hero of the play from indigence to affluence, we smile at the startling change, but are sceptical as to the occurrence of such abrupt transitions in real life. Yet the imagination of the dramatist is tame compared with the realities of mining experience. For instance, upon a few feet of ground adjoining that the prolific yield of which has been alluded to, the labour of, perhaps, twelve months had been bestowed, apparently without success, and the disheartened "prospectors" offered it for sale for 20*l.*, without finding a purchaser. Suddenly occurs a revolution in the wheel of fortune, and that which a short time previously was reckoned worthless acquires a value which can scarcely be estimated.

Poverty Reef is believed to be the richest reef in the colony. Golden stone was first discovered on the surface, but it is only within the past six or seven years that systematic operations were commenced. The prospectors, Messrs. Beynon and Co., after considerable labour and discouragement, succeeded in striking the reef, which yielded variously from 4 to 8 ozs. per ton. Other claims were rapidly taken up (in some of which gold was traced from the surface), and as each touched the rich lode the fame of "Poverty Reef" spread throughout the colony. This reef runs nearly due north and south, and dips heavily to the south. The lode consists of a series of "makings," or distinct masses of stone, each having an underlie. In the prospector's claim, for instance, a mass of sandstone, 61 ft. thick, was passed through, then a body of quartz was got 75 ft. thick a thin band of slate separating that "making" from the one beneath it, and so on. Three or four distinct masses of quartz have thus been discovered and worked. Upon one or two occasions the reef in this claim has been lost for several feet, the lode at each fresh recovery being invariably of a greater width. At a depth of between 300 and 400 feet it is 23 ft. wide, and has yielded as much as 30 ozs. to the ton.*

The adjoining claim (King's) presents a remarkable instance of the good fortune which occasionally falls to the lot of individuals in quartz mining enterprise. Abandoned twice previously, it remained for the indomitable energy and perseverance of the present owner to develope its seemingly inexhaustible wealth. It has now been successfully worked between eight and nine years, and the principal shaft has been carried down to a depth of between 400 and 500 feet, where the prospects are stated to be as good as ever. As much as 40 ozs. to the ton have been taken from stone raised in this claim, the reef averaging 22 ft. wide, but the general average of the yield is from 5 to 10 ozs., the lode growing richer as it is carried down. The whole of the stone, which contains a large amount of arsenical and other pyrites, is burnt on the premises previous to being crushed at the mills of the proprietor, who drives three pairs of Chilian rollers and a double battery.†

The Columbian reef, Inglewood, was taken up on Dec. 1, 1859. The discoverers, Messrs. Heron and Wheeler, who had been unsuccessful in alluvial mining, were leaving the district, when they accidentally picked up some good specimens on the surface. A prospecting claim was taken up, and a vein found, which was followed down for about 50 ft., the stone at this depth yielding 4 ozs. to the ton. In the following June they purchased a fourth share in an adjoining claim, for which they paid 420*l.* A promising leader was struck in this claim; and, being followed up, led to the discovery of a magnificently rich "pocket" of quartz, 22½ tons of which yielded 2295 ozs. of gold.‡ This was followed by a further reduction of 80 tons of stone, which returned 3200 ozs., or at the rate of 40 ozs. to the ton, and a clearly-defined lode was cut, which has since continued to prove highly productive, upwards of 20,000 ozs. having been taken from this claim. No. 2 claim, on the same reef, has been almost as prolific as the former, 40,000*l.* having been taken out in little better than twelve months, the stone averaging throughout nearly 8 ozs. to the ton. In No. 3 and several other claims the lode increases in width as the shaft deepens.

The Inkerman Reef, Dunolly, was first discovered by two Nova Scotians, who had been unsuccessful, and selecting the ground for its surfacing indications, were rewarded by finding gold in the gravel and rubble. The course was laid open, and a quantity of rich-looking stone was raised; this was put through the Chilian mill and pounded, the proportion of gold to stone being such as to necessitate a second and third emptying of the machine, in order to ensure freedom of operation; the best part of this yielded at the rate of 3000 ozs. per ton, 200 lbs. of stone having produced 265 ozs. of gold. From such a return it was supposed that the cap of a very rich lode had been struck; but although the yield continued to be extraordinarily good for some depth, the second and third crushings returning respectively 285 and 200 ozs. of gold per ton, no traces of a main reef were discovered. After the upper stone had been passed through, the veined narrowed and dipped heavily, traversing a mass of sandstone and also of slaty rock, until at a depth of 100 ft. it was comparatively a mere thread, but continued to yield a large percentage of gold—the latest crushing, a few months back, giving upwards of 97 ozs. per ton. A fresh perpendicular shaft was now carried down to the chamber of the old workings, which struck the water level, the ground in the meantime having been worked for a year and half. But although a recent spread of stone and its appearance denote a more permanent character, it is probable that no main lode will be reached under a considerable depth, the characteristics of the ground in working the prospector's claim on the Acadian being strongly analogous to the experience of the Mariner's Reef at Maryborough.

In the case of Wilson and Marshall's "patch" of stone at M'Intyre's, symptoms of a reef abounded on the surface. This ground had been the scene of former alluvial workings, where heavy deposits were realised, and it was in searching for a primary vein that the present (1860) discovery was made. The "cement," or conglomerate, containing the gold was obtained from a vertical "casing," or wall, flanking the claim, and consisted chiefly of a tough, indurated schist and sandstone. This cement was thickly impregnated with gold, the material being in parts laced and held together by its massive veins. The bulk, when reduced, yielded upwards of 30 per cent. of pure metal—130 lbs. weight of stone having produced nearly 500 ozs. of gold. This patch was raised within a few feet of the surface, from ground forming a portion of a claim which had formerly been worked by M'Evoy and party, and from which one of the series of large nuggets (for which this district is celebrated) was obtained. In pursuance of the original object, a shaft was sunk to the depth of 100 feet, but no traces of a lode could be discovered, and the ground was shortly afterwards abandoned. The prospectors of Maxwell's Reef, Inglewood, obtained nearly 30,000*l.* worth of gold during the first two years, the lode at 120 feet being 20 feet wide, and richer than the upper stone, the gold being equally distributed throughout the vein. One of the claims on the Jersey Reef lately yielded 1065 ozs. of gold, the produce of 210 tons of stone, or about 420*l.* for a fortnight's work. The lowermost stone on this reef is also found to be the richest in gold. The prospector's claim on the Union Reef, Kingower, has yielded upwards of 180,000*l.*, the lode averaging from 20 to 30 feet thick.

On the Bendigo an old Waterloo veteran and his son, whose labours extended over six years, obtained 50,000 ozs., of the value of 200,000*l.*, from 48 yards of the Victoria Reef and its spurs. Another party (Roberts) obtained 40,000*l.* worth of gold from a small claim of 30 yards in length; while a third claim on the same reef gave 1000*l.* per yard. On the Eastern Victoria, two small parties of Germans realised 40,000*l.* in six months. The Adventure Company, on the same reef, crushed 1060 ozs. from 40 tons of stone, taken at a depth of 200 ft.: and on one occasion obtained as much as 150 ozs. from four buckets-full of stone. An old man and his two sons, well known on Tarrangower, who were for a long time engaged in washing surfacing, which were wheeled down from the ranges, prospecting "Nuggety Reef," shortly after Dr. Lyle's casual discovery, experimented upon some surface quartz, and opened a vein, from which they realised over 100,000*l.* in a few years. The owners of one of the claims at Wood's Point, the new field on the Upper Goulbourn, obtained, between June and December, 1863, over 40,000*l.*

PROFITABLE MINING IN AMERICA.—The well-known Cliff Copper Mine of Lake Superior has returned $1,600,000 upon an outlay of $66,000, and the value of the mine is now estimated at not less than $3,000,000. The Cleveland Iron Mining Company have declared an extra dividend of 5 per cent. The income for the last year was nearly $400,000, and the company have at present 235,000*l.* surplus in hand. The yield of the 37 silver mines in Nevada territory is estimated at $1,000,000 per month, and of this the Gould and Curry Mine furnishes nearly one-half. The Heckendorn Company of Blue Mountain have obtained 94 lbs. 4 ozs. of gold from 33 tons of rock; the rock will pay about 45*l.* per ton.

GOLD IN CRYSTAL.—The question has frequently been raised, whether gold has ever been found in a crystal of quartz, and, although several specimens showing such a combination have been submitted to us from time to time, we have never until lately seen one where the crystal has been pure, and the specimen quite free from some admixture of quartz itself. Mr. Edge, a shareholder in one of the claims on Castle Reef, Raspberry Creek, recently showed us a single crystal, quite deserving of its name, of fair size, in the side of which there was a hollow containing a little lump of gold. The precious metal filled up its transparent nest and protruded a little beyond, the crystal was otherwise perfect, and, altogether, a little gem of its kind.—*Dicker's Australian Mining Record.*

HEAT AND LIGHT.—If a body, such as a piece of iron, be heated and allowed to cool in the open air, the heat gradually passes off from the surface in straight lines, in the form of rays, in the same manner as light proceeds from the candle or the sun; this is called radiant heat. Radiant heat is supposed to move with the same velocity as light; that is, at the rate of 192,000 miles per second.

A first attempt was made to fish by electric light a short time since at Dunkirk. The light was supplied by a pile on Bunsen's principle, composed of about 50 elements, and it succeed tolerably well, but the employment of the pile was attended with much inconvenience. It was then determined to repeat the attempt with a magneto-electric machine. The new experiments tried at Dunkirk and Ostend had a double object—1. To prove how the light produced by the machine would act under water.—2. To discover the effect the light would produce on the fish. The first object was completely accomplished, and it is now demonstrated that magneto-electric machines and the light they produce are applicable to all submarine works. In fact, this light was constant at 180 feet under water, and it extended over a large surface. The machine, nevertheless, was placed at a distance of more than 300 feet from the regulator of the electric light. The glass sides of the lantern remained perfectly transparent, and the quantity of coal consumed to drive the magneto-electric machine was less than if the light had been in the open air.

* Mr. R. B. Smyth (the Secretary for Mines) says:—"These older rocks, with the mineral veins which they contain, have been subject to extensive denudation. A considerable vertical height has been ground down through the lapse of ages, and again deposited in beds of greater or lesser thickness in the adjacent valleys. Modern changes, such as take place daily, owing to the action of the weather, are continually tending to the deposit of auriferous sands and clays in the beds of the gullies and small watercourses.

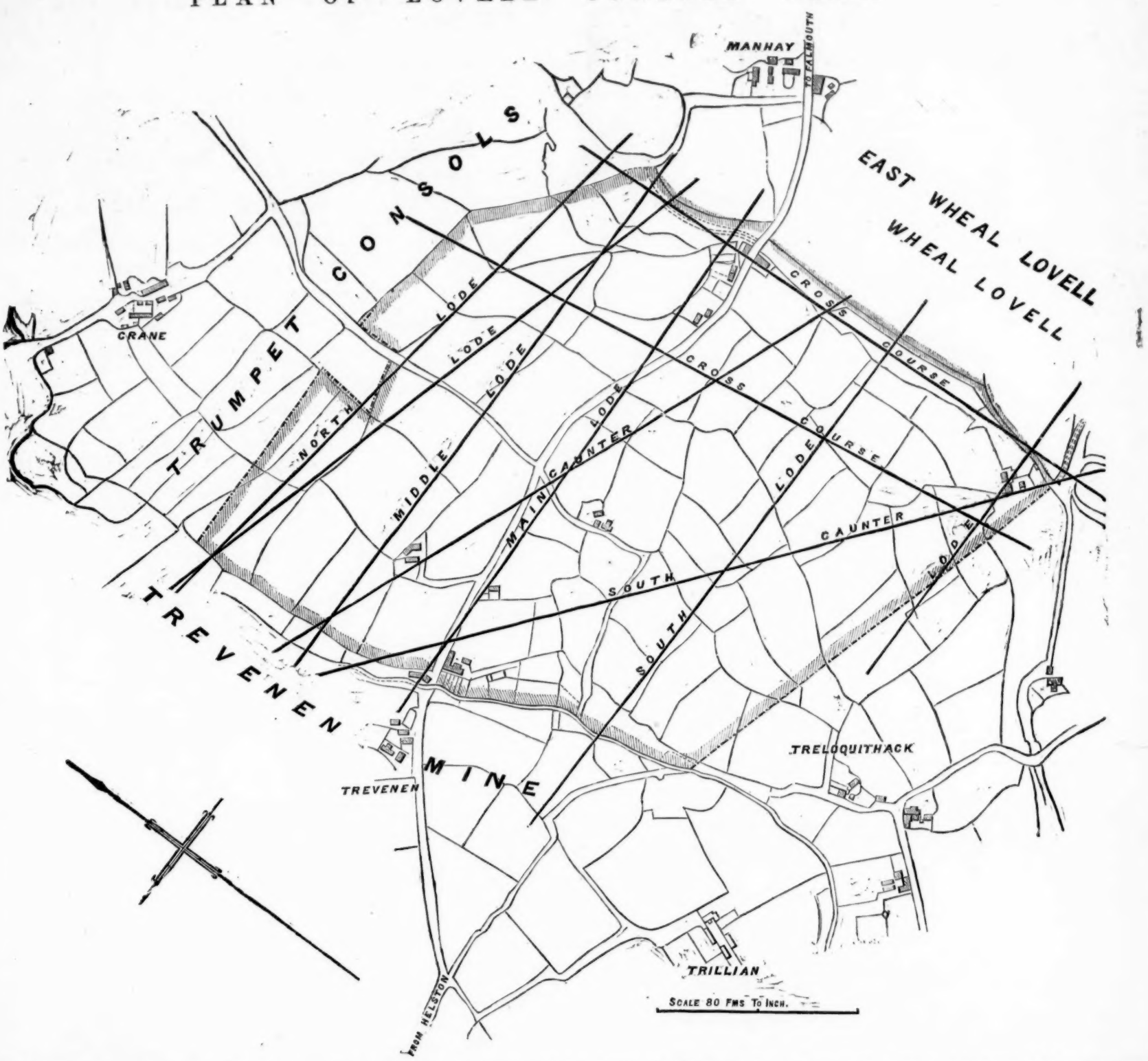
† An exception to the general form of deposition exists at Wood's point, the seat of the late discoveries on the Upper Goulbourn. There the gold is found in veins running east and west. This is also the case to some extent at Rushworth and Warranga, where the direction of the rocks is a few degrees north or south of east. ‡ The water level.

* Upwards of 50,000 ozs. is stated to have been taken from the prospector's ground.

† As illustrating the richness of "Poverty," it may be mentioned that some five years ago a spare piece of ground, lying between King's and the Prince of Wales's claim, measuring about 7 ft. along the line of reef (the available area barely affording space for the construction of an ordinary shaft) was taken possession of and worked by a Mr. Baker, whose sharp practice, in a short time, diverted something like 10,000*l.* from the pockets of the chagrined but powerless claimholders on each side.

‡ This was the largest piece of amalgamated gold ever retorted, weighing 2 cwts.

PLAN OF LOVELL CONSOLS MINE.



During the last few months very great attention has been attracted to this rich district, which was at one time second only to that of Wheal Vor in the production of tin. Within the last 12 months East Wheal Lovell has risen from about 3*l.* per share to as high as 23*l.*; and, although every effort has been made, both openly and privately, to depreciate the market value of the stock, the continued improvements in the mine have (even in the face of all these obstacles, added to a general depression of the market) prevented any considerable fall from the above price. The mine is now looking better than ever, and there is every probability that for many years to come it will be one of the leading tin mines of Cornwall. East Lovell, however, although now taking the lead in the district, is by no means the only rich mine in it, since it is on record that Wheal Lovell has produced more than 200,000*l.* worth of tin, and that Trevenen yielded in one year for dues alone more than 20,000*l.*, which, supposing the dues to be as high as 1-10th (1-15th being about the average of the county), would make the returns of tin from this mine in one year alone more than 200,000*l.* Lovell Consols is situate between Wheal Lovell and Trevenen, having the same lodes as those which have proved so rich in each of those mines. Immediately adjoining, and having parallel lodes intersected by the same cross-courses, is Trumpet Consols, which has produced tin to the value of 500,000*l.* sterling, and in the immediate neighbourhood of Wendron Consols and Basset and Grylls, the former of which has produced enormous quantities of tin, and the latter of which is a valuable and rapidly-improving mine. There cannot be a doubt that in such a district, with lodes which have been so productive wherever they have been tried, with cross-courses which have produced such favourable influences on parallel lodes immediately adjoining, that Lovell Consols is a speculation which may fairly be considered as second to none in Cornwall.

FOREIGN MINES.

RHENISH CONSOLS.—The water-wheel at Christiania is now completed, and the drainage of the shaft will at once be effected, and the sinking recommenced. At Bleibach, the increase of water in the shaft necessitates the fixing of pump-work, which will be done as speedily as possible. The shaft is now 6 lachters below the adit. The north lode, in driving west, has been disturbed by the intersection of a cross-course. The lode is now resuming its former regularity, and the men are pushing on the drivage as vigorously as possible. At James Watt the men are making good progress in sinking the new shaft, which is now 11 lachters deep. The water is, however, increased to 250 gallons per hour.

UNITED MEXICAN.—Guanaxuato, May 23: Mine of Jesus Maria y Jose: The two cross-cuts, at present the principal works of interest, have not yet given any definite result; that of La Trinidad has advanced 8·05 varas during the last four weeks, but the end is still in mountain stuff, though with some indication of the vein. The cross-cut at San Carlos has passed through one of those inferior branches of the vein which often occur in this part of the mine, but has not yet reached the principal body. The frente of Santa Elena is in ore of a fair class, 1½ vara wide. The frente of El Ninio has tolerably good ore, 1 vara wide; and the reserves in the levels of La Trinidad and Santa Cecilia are giving a fair quantity of good ore, a part being excellent. The upper frente of San Juan continues tolerably good. The buscones are keeping up the usual quantity for sale, and at some points the quality has improved. The extraction in four weeks has been 2655 cargas by the buscones, sold for $10,863; and 3490 cargas by the regular miners, of which 1156 cargas have been sent to the haciendas, the remainder being retained for the present at the mine. I informed you last month of my having reduced the extraction at the mine till a more favourable season (as the present promises to be) may have lessened the high price of all articles consumed, and consequently the cost of reduction. On the first three months of the year there was an average loss of $6800 per month on the silver, not taking into account the value of the gold. On the last month the loss on the silver is $827, but as the gold (not included) is worth about $5000 the result is much better.—Mine of La Trinidad: The expense fully covered by ore sold.—Remittance: I am glad to announce that after numerous delays I have sent off per conducta to Vera Cruz $80,000, free of duties, freights, and expenses, except as to agency, &c., at Vera Cruz. The Government, in a liberal spirit, has charged 5 per cent. duties instead of 8 per cent., payable in Mexico.—N.B. This remittance had not arrived at the port of shipment in time for the present packet, therefore it will come forward by the next mail.

COPIAPO.—May 15: Checo: In the winze in the 65, east of Price's shaft, there is a good lode of ore. The lode in the end driving west in the 50, east of Price's shaft, is still improving, producing a little ore of 12 per cent. In the 70, driving west, the lode is 2 ft. wide, and is looking very promising for the production of metal.—G. MATTHEWS.

DULCINEA.—Bottom End North: The lode in this end, driving north, continues rich, leaving good stopes as we progess towards the winze; this end, when communicated to the winze, will greatly facilitate our workings on the bunch. The bottom stope continues as rich as when last reported; ore continues north and south in our present levels; work to explore in extent. The 25 south continues rich, and as we drive the lode becomes more solid.—Cross-cut Winze: During this half month a slide has been broken down which was left from the day of sinking the winze. Now we have commenced work the ore in this winze has again become rich. The metal extracted is equal in quality to that which is being produced from the bunch.—New Winze: This winze, sinking south, is not producing much metal, owing to the ground becoming more solid and very hard. To-day the measurement of the sett took place; it is 400 varas in length, and 100 varas in breadth. Of the measurement more can be said in my next report. The time at present does not allow me to explain its position and what quality ground we occupy. In my next report, for the end of May, I shall endeavour to give a minute explanation.—R. H. MACKAY.

CAPE COPPER.—May 16: I beg now to hand you mine reports and cost-sheets for the past month, by which you will be gratified to perceive everything has gone on well and satisfactorily. From Ookiep the yield has risen to 318 tons, averaging 28 per cent., and from Spectakel the yield has been 151 tons, averaging 25 per cent. Smelting operations, you will perceive by Mr. Davis's report, have been fairly commenced; and though the usual difficulties have been met with in starting a new method of reduction in a wild country, and though no exact estimate can yet be formed as to the results, there appears no reason to doubt that ultimate success will attend the trials. If the new process answers as well as we have reason to expect, the only question will be as to the possibility of getting up sufficient fuel to Springbok; and, as effecting this, I beg to report having made a contract with Mr. Torbet here for carrying all the ores and goods of the company.

LINARES.—June 18: West of Engine-shaft—South Lode: In the 110, west of engine-shaft, the vugh is getting smaller; the lode is large, containing good stones of lead, worth 1 ton per fm. The lode in the 95, west of No. 129 winze, is improved, being compact and firm, and worth 1½ ton per fm. In the 85, west of Marino's winze, we have intersected some strong joints crossing the end, and also some veins of spar, letting out much water. In the 51, west of Crosley's engine-shaft, the lode is small, and appears to be disordered.—East of Engine-shaft: The lode in the 110, east of engine-shaft, is large and strong, and very hard for driving. In the 95, east of No. 135 winze, the lode is large, consisting of calcareous spar and lead ore. The lode in the 85, east of No. 134 winze, is still large, but entirely unproductive. In the 75, east of cross-cut, there is still a good stone of lead in back of the end, but not so productive as it was.—North Lode: The 85, east of No. 132 winze, is driving through a large kindly lode, worth 1 ton per fm., and containing also some good stones of copper. The 75, east of Field's shaft, has fallen off in value during the last few days, and is now worth 1 ton per fm.—Shafts and Winzes: The sinking of Crosley's engine-shaft will be resumed in a few days.—In No. 136 winze, below the 85, the lode is small; we expect to hole in a few days. The lode in No. 137 winze is improving, now worth 1 ton per fm. The lode in No. 138 winze is very wide, yielding large stones of lead, and is now speedy for sinking, worth 2½ tons per fm. Rendon's winze is suspended for the present. No. 139 winze is going down in a fine lode, worth 2 tons per fm., and is likely to open out a good piece of tribute ground. The lode in No. 140 winze is large, and spotted with lead throughout. We made a trial of Crosley's engine some days ago, and found it work remarkably well. The two plunger-lifts are now being drawn up from Warne's engine-shaft, in order to send the water back through the 51 to Crosley's engine; as soon as this alteration is completed both engines will be set to work, and all the difficulty respecting the water in this section of the mine entirely removed.

LUSITANIAN.—June: Palhal Mine—Basto's Lode: The lode in Taylor's engine-shaft has not been taken down for the last ten days. In the 70, west of River shaft, the lode is worth 1 ton per fathom; ground very hard. The ground in the 50 cross-cut is of a hard gneiss. In the 80, east of Taylor's, we have cut the middle lode, which has formed a junction with Basto's lode, or rather passed through it; the lode is 1 ft. wide, but poor. The lode in the 80, west of Taylor's, is unproductive. In the 70, east of Taylor's, the lode is 1½ ft. wide, composed of quartz and a branch of ore, worth ½ ton per fathom. In the 70, west of Taylor's, the lode is worth 1 ton per fm. The lode in the 60, west of Taylor's, is worth 1 ton per fathom. In the 60 cross-cut, north of River shaft, the ground is of a hard gneiss. The lode in the 50, west of slide lode, is very small, and without mineral. The lode in the 50, west of Mill lode, is 2 feet wide, composed of flookan and schist. In the 38, west of slide lode, the lode is composed of quartz and soft silica, with stones of lead. In the 28, west of Perez' shaft, the lode is worth ¾ ton per fathom. The lode in the 18, west of Perez' shaft, is unproductive. In the winze below the 70 the lode is worth 1 ton per fathom.—Stopes: In the stope above the adit, west of Perez' shaft, the lode is worth 1 ton per fathom. The stope between the 8 and the adit is worth ¾ ton per fathom. The stope between the 50 and 38, by Norte's winze, is worth 2 tons per fathom. The stope between the 60 and 50 is worth 1 ton per fathom. The stopes between the 70 and 60 is worth 1¼ ton per fathom.—Levels on Caunter Lode: The lode in the 60, east of slide lode, is worth nearly ¼ ton per fathom. In the 50, east of Machado's winze, the lode is worth ½ ton per fathom. The lode in the 50, west of Machado's winze, is unproductive.—Stopes: The lode in the stopes above the 50, west of Machado's winze, is worth 1¼ ton per fathom. The stopes above the 60, west of Jacintro's winze, are worth 1¼ ton per fathom. The average value of the stopes between the 60 and 38 fm. levels is ½ ton per fathom. The lode in the stopes between the 40 and 20 fm. levels is worth on an average 1 ton per fathom. The lode in the 28, west of Mill lode, is composed of quartz and spots of lead.—Carvalhal Mine: In the adit level, west of incline-shaft, the lode is composed of quartz and spots of lead. The lode in the adit level, east of the River Caima, is composed of rusty spar. In the adit, west of the River Caima, we are cutting south in search of the lode, but as yet have not found it.

NEW WILDBERG.—Z. Walls, June 25: The cutting of the plat at the 30 lachter level, Carter's shaft, will be completed this afternoon, and on Monday next the cross-cuts north and south will be commenced to intersect both the Dornergang and Erbteifstergang lodes. We have set a new stope in back of the 20, on the Erbteifstergang lode, to six men, worth about 2½ tons of silver-lead ore per lachter. The other two stopes at work in the back of this level are worth on an average 1½ ton of silver-lead ore per lachter. The No. 1 stope, in back of the 10 lachter level, on the Dornergang lode, is worth 1 ton of silver-lead ore per lachter; No. 2 stope is worth 1½ ton; and No. 3 stope is worth 1¼ ton of silver-lead ore per lachter. We have three stopes at work in back of the deep adit, on the Gottes-Hülfe lode, producing on an average for each stope 20 cwts. of silver-lead ore per lachter. The two stopes in back of the 10, east from Michael's shaft, are looking well, and are at present worth for each stope 2 tons of silver-lead ore per lachter. The stopes and tribute pitches above the adit, in the old men's workings, are producing about the average quantity of silver-lead ore. The 20, driving west from Carter's shaft, on the Dornergang lode, is worth from 15 to 20 cwts. of silver-lead ore per lachter. We shall be in a position in the early part of next month to set a new pitch in the back of this level. The 10 lachter level west, on the same lode, is producing a little ore, but not to value. The profits for May month were 625*l.* 15s. 4d.

EAST KONGSBERG.—D. T. Macdonald, June 17: South Ramsrud: During the past week the vein has given a little native silver in the east level. The object of driving the cross-cut south is to ascertain if a vein seen at surface holds down in depth.—Neues Gluck: The ground continues hard for driving by powder.

MARIQUITA AND NEW GRANADA.—Santa Ana Mine, for the month of January:—Coat, $14,112; returns, $13,140. Report for April:—In the stopes in bottom of the 100, north of winze, the lode is about 6½ feet wide, and continuing very rich—stoped 2 fms., let at $75 per fm. In the stope in back of the 110, north of winze, the lode is about 6 ft. wide, producing small rich branches of dry stamps' mineral, but is not quite so rich as it has been, as it is near the extremity of the course of mineral in this level. In the stope in back of the 110, south of middle winze, the lode is about 6 feet wide, producing rich dry stamps' mineral—stoped 2 fms. The new shaft was cut down last month 1 fm. 3 ft. below the 100 fm. level; I hope in two months to have the shaft completed to the 110, as I shall push it on with all possible speed. The skip-road is completed 5 fms. below the 90. In the 110 cross-cut east the ground is very hard for driving, no change to notice since my last—down 2 ft. 6 in., let at 80s. per fm. The 100 cross-cut east was driven 1 fm. last month, and cut a small branch of rich mineral, but we intend to drive on to see if there are any more branches in this direction. European and native timbermen have been employed fixing skip-road in new shaft, securing the 110 and the 100 fm. level, the 100 back, and the 110 bottom stopes, and also the adit, repairing Illingworth's stope, attending to pitwork, and sundry other work in the mine. Birchall's lode is about 3 ft. wide, producing stones of rich pyrites and grey silver; the ground is more settled, and letting out a great deal of water. The men were employed last month stoping the bottom of the level; at present they have resumed the end—set at $70 per fathom. The east lode is about 3 ft. wide, producing occasional stones of fine pyrites; the ground is composed of quartz, slate, and prian, and has a very kindly appearance. No change to notice in any other part of the mine.—E. R. RIDDINGTON.

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The PATENT TUBULAR TUYERE possesses GREAT ADVANTAGES over the ORDINARY TUYERES, both for its DURABILITY and EASY WORKING. A current of cold water going direct to the nozzle prevents their destruction, however much they may be exposed to the fire.

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No. 1 tuyere,	16 in.	long	28s. each.
No. 2	18	"	32s. "
No. 3	20	"	36s. "
No. 4	22	"	40s. "
No. 5	24	"	44s. "

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PUBLIC TEST OF WIRE-ROPE.—

The SUPERIOR QUALITY of GARNOCK, BIBBY, AND CO.'S WIRE-ROPE was FULLY PROVED by a RIVAL MANUFACTURER at the LIVERPOOL PUBLIC TESTING MACHINE, on the 29th of October, 1860, on which occasion GARNOCK, BIBBY, and Co.'s ropes were found to be the STRONGEST of all the TWELVE SAMPLES from different makers then tested, as reported in the papers of the day. For example:—
(Certified by Mr. William Macdonald, superintendent.)

Sizes.	Garnock, Bibby, and Co. Tons	c.	Corresponding sizes from other manufacturers. Tons	c.	Tons	c.
3¼ in.	18	5*	16	10	11	10
2¾ in.	8	15*	7	15	5	9

Remaining sizes with similar results.

* Samples taken promiscuously from stock by a rival manufacturer's agent.

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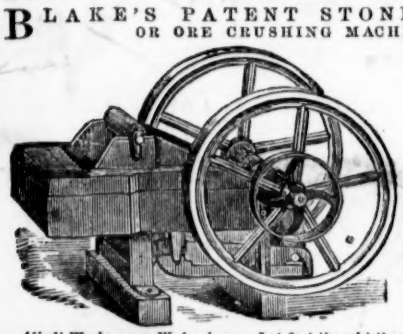

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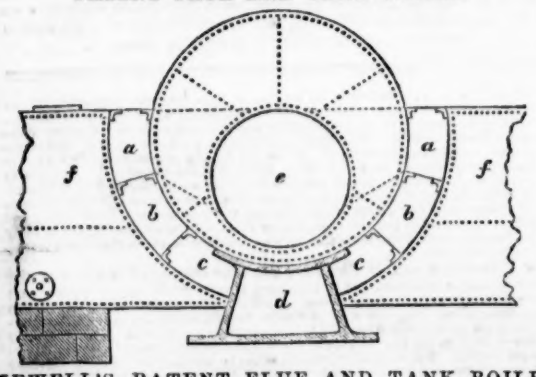


JEWELL'S PATENT FLUE AND TANK BOILER.
A PLAN FOR ECONOMISING THE CONSUMPION OF FUEL IN STEAM BOILERS.

The advantages of this boiler, an illustrated description of which was published in the MINING JOURNAL of October 3, are obvious.

It is provided with WROUGHT IRON FLUES, conveying the fire entirely over the surface of boiler below the water line, and wholly doing away with lime coming in contact with any part of the boiler, lime having been found to destroy the boiler plates before any other parts are the worse for wear. This boiler has four additional flues to the plan at present adopted, thus affording a FAR GREATER AMOUNT of HEATING SURFACE, and MORE EFFECTUALLY CONSUMING the GASES. Between the boilers a wrought-iron tank is fixed, extending the whole length of the boilers, for containing water for feed; this water will pass into the boiler at any temperature required. This boiler will not require anyone to enter the flues for cleansing, as the flues are provided with shifting stoppers at the ends, enabling a person to cleanse the flues even while the boiler is hot; this plan answers for any size or length boiler, and will do away with the cold water feed, which has been the cause of so many accidents. These flues are made of wrought or cast-iron. On the top of the tank a pipe will be placed, to take the waste steam that escapes and carry it to the cistern. The flues for a 6 ft. boiler will be 2 ft. long, and the usual width. It must be remembered that the tank once hot will remain a hot body, with the same amount of heat that passed off before in the brick flues. I would observe that there will be no more water taken from these tanks than will be required for the feed, consequently no more cold water will pass into these tanks than will be necessary for feeding. It is believed this plan will SAVE TEN FEET in the LENGTH of BOILER, and it has been proved to EFFECT a SAVING of rather MORE than ONE-THIRD in the CONSUMPTION of FUEL. These boilers, with flues and tanks, can be supplied on the most reasonable terms.

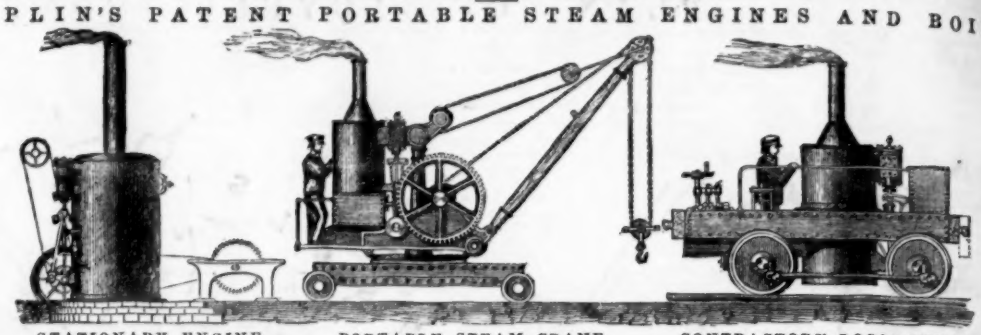
NOTE.—This plan of Flues and Tank Boiler will be found very beneficial for MARINE ENGINES; the tank would receive the water from the sea, and would not only become hot for feed, but would be the means of preventing in a great measure the salt from passing into the boiler. Where great quantities of hot water are required for other purposes, these tanks will also be found very beneficial. JOHN JEWELL.

Basset Foundry, Devoran, September 30, 1863.

*** Mr. JEWELL is PREPARED to GRANT the ROYALTY to any parties, for certain districts of the United Kingdom.

Prize Medal, International Exhibition, 1862.

CHAPLIN'S PATENT PORTABLE STEAM ENGINES AND BOILERS.



STATIONARY ENGINE. From 1 to 30 horse power. PORTABLE STEAM CRANE. 1 to 30 tons. CONTRACTORS' LOCOMOTIVE. 6 to 27 horse power.

From the STRENGTH, SIMPLICITY, and COMPACTNESS of these ENGINES, they are now extensively used for general purposes; also in situations where steam-engines of the ordinary construction cannot be applied.

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PORTABLE STEAM CRANES,—for wharf or railway, with wrought-iron carriages on wheels, link motion, foot brake, &c., all under the easy control of one man; the larger sizes hoist, lower, and turn round in either direction by steam.—*These Cranes were selected by H.M. Commissioners for receiving and sending away the heavy machinery at the International Exhibition of* 1862.

CONTRACTORS' LOCOMOTIVES,—are adapted to work on rails or tramways, of a guage from 2 feet upwards. They are complete and efficient locomotives, simple in construction, and the working parts easily got at for repair. They draw heavy lodes at reduced speeds. These engines are usually sent in one package, ready for work on arrival.

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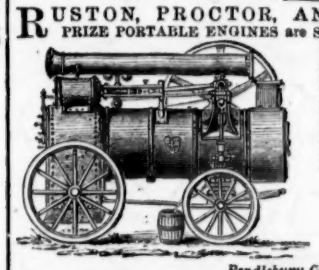
International Exhibition, 1862—Prize Medal.

JAMES RUSSELL AND SONS
(the original patentees and first makers of wrought-iron tubes), of the CROWN PATENT TUBE WORKS, WEDNESBURY, STAFFORDSHIRE, have been AWARDED a PRIZE MEDAL for the "good work" displayed in their wrought-iron tubes and fittings.

Warehouse, 81, Upper Ground-street, London, S.

Prize Medal, International Exhibition, 1862.

RUSTON, PROCTOR, AND CO.'S CELEBRATED PRIZE PORTABLE ENGINES



are SPECIALLY ADAPTED for WINDING, PUMPING, SAWING, &c. These engines have, in public competition, won the highest honours. For ECONOMY in WORKING, LARGE ALLOWANCE of POWER in CYLINDER AREA and PROPORTIONATE SIZE of BOILER, STRENGTH of CONSTRUCTION, HIGH FINISH, and GENERAL EFFICIENCY, they are unrivalled, having recently been AWARDED THIRTEEN GOLD, SILVER, and BRONZE PRIZE MEDALS, And numerous other prizes.

Messrs. A. Knowles and Sons write:—

Pendlebury Colliery, near Manchester, June 5, 1861.

GENTLEMEN,—We beg to inform you that we have now in use the portable engine of 8 horse power you supplied us with, and have great pleasure in informing you that it works well, and we are much pleased with the workmanship and finish of it.

We are, yours respectfully, ANDREW KNOWLES AND SONS.

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The CRUCIBLES manufactured by the PATENT PLUMBAGO CRUCIBLE COMPANY are the ONLY KIND for which a MEDAL has been AWARDED, and are now used exclusively by the English, Australian, and Indian Mints; the French, Russian, and other Continental Mints; the Royal Arsenals of Woolwich, Brest, and Toulon, &c.; and have been adopted by most of the large ENGINEERS, BRASSFOUNDERS, and REFINERS in this country and abroad. The GREAT SUPERIORITY of these melting pots consists in their capability of melting on an average 40 pourings of the most difficult metals, and a still greater number of those of an ordinary character, some of them having actually reached the EXTRAORDINARY NUMBER of 96 meltings. They are unaffected by change of temperature, never crack, and become heated much more rapidly than any other crucibles. In consequence of their great durability, the saving of waste is also very considerable.

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For lists, testimonials, &c., apply to the Patent Plumbago Crucible Company, Battersea Works, London, S.W.

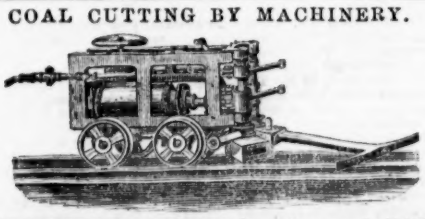
Fully described in the MINING JOURNAL of July 5.

TESTIMONIAL JUST RECEIVED.

Queen's Cross Brass Foundry, Dudley, June 10, 1864.—We have much pleasure in giving our testimony to the great superiority of your crucibles. We have constantly used them for the last four years, and find that we can melt with one of the 100 lb. crucibles from 35 to 40 cwts. of our steel mixture for bearings, which we consider tries the pots much more than the ordinary brass or gun metal. There is also a very considerable saving in fuel and time, as we now make one furnace do the same work two formerly did with the clay pots. There is also much less waste from oxidation, in consequence of the metal being so quickly melted. After having tried many kinds, we have no hesitation whatever in pronouncing them to be the best and most economical crucibles that can be used, and so long as the quality is as good as it has hitherto been we shall on no account think of using any others.

We are, Sirs, faithfully yours, W. WESTLEY AND SON.

COAL CUTTING BY MACHINERY.



MESSRS. RIDLEY AND CO. have, by recently PATENTED IMPROVEMENTS, COMPLETED their TRUNK COAL CUTTING MACHINE, WORKED by COMPRESSED AIR, and are NOW PREPARED to NEGOCIATE for the USE, and to SUPPLY MACHINES, which will be found to COMBINE SIMPLICITY of CONSTRUCTION with PORTABILITY and ECONOMY in WORKING. By the use of these machines a CONSIDERABLE SAVING of COAL is EFFECTED, and the COST of LABOUR MUCH REDUCED. Each machine will be guaranteed as to its capabilities, &c.

All applications to be made to Messrs. RIDLEY and Co., No. 11, South-street, Finsbury, London, E.C.

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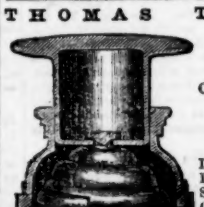

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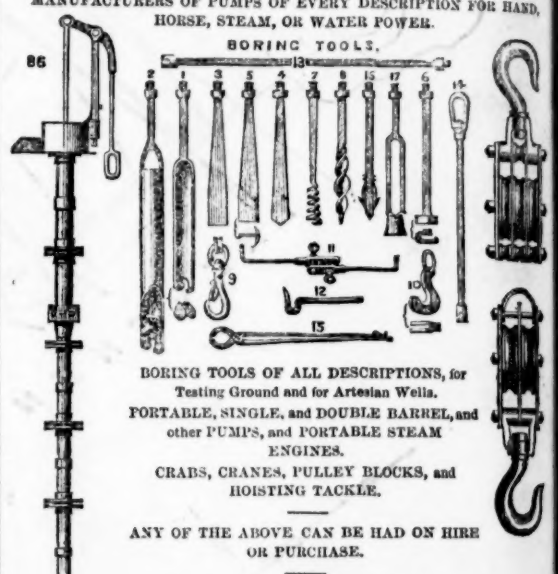

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